DRAFT REGULATORY GUIDE

C-218 (E)

PREPARING CODES OF PRACTICE TO CONTROL RADIATION DOSES AT URANIUM MINES AND MILLS

Issued for public comments by the
Atomic Energy Control Board
November 1999

Atomic Energy Control Board
Commission de contrôle de l'énergie atomique

Canada

AECB Regulatory Documents

The Atomic Energy Control Board (AECB) operates within a legal framework that includes law and supporting regulatory documents. Law includes such legally enforceable instruments as acts, regulations, licences and directives. Regulatory documents such as policies, standards, guides, notices, procedures and information documents support and provide further information on these legally enforceable instruments. Together, law and regulatory documents form the framework for the regulatory activities of the AECB.

The main classes of regulatory documents developed by the AECB are:

- **Regulatory Policy:** a document that describes the philosophy, principles and fundamental factors used by the AECB in its regulatory program.
- **Regulatory Standard:** a document that is suitable for use in compliance assessment and describes rules, characteristics or practices which the AECB accepts as meeting the regulatory requirements.
- **Regulatory Guide:** a document that provides guidance or describes characteristics or practices that the AECB recommends for meeting regulatory requirements or improving administrative effectiveness.
- **Regulatory Notice:** a document that provides case-specific guidance or information to alert licensees and others about significant health, safety or compliance issues that should be acted upon in a timely manner.
- **Regulatory Procedure:** a document that describes work processes that the AECB follows to administer the regulatory requirements for which it is responsible.

Document types such as regulatory policies, standards, guides, notices and procedures do not create legally enforceable requirements. They support regulatory requirements found in regulations, licences and other legally enforceable instruments. However, where appropriate, a regulatory document may be made into a legally enforceable requirement by incorporation in an AECB regulation, a licence or other legally enforceable instrument made pursuant to the *Atomic Energy Control Act*.

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NOTICE

On March 20, 1997, Bill C-23, the *Nuclear Safety and Control Act* (NSC Act, the Act), received Royal Assent. New regulations that are derived from this Act will become law and replace the existing regulations. Draft Regulatory Guide C-218 references the *NSC Act* and new regulations, which will come into force in 2000 on a date to be fixed by order of the Governor in Council.

About this Document

Comments

In order for interested persons to determine this document's impact and value, public comments are being solicited. At the end of the comment period, all comments will be studied to determine how best to improve the document. Unless otherwise requested, a copy of all comments received will be placed in the AECB Library, in Ottawa. Comments on this guide will be most helpful if received in writing by December 31, 1999. Reference our file number 1-8-8-218, and direct enquiries and/or comments to the address below.

Document availability

The document can be viewed on the AECB internet website at www.aecb-ccea.gc.ca. A copy of C-218 may be ordered in English or French from:

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Purpose

This draft regulatory guide helps applicants for uranium mine or mill licences develop codes of practice in accordance with the *Uranium Mines and Mills Regulations* for the purpose of controlling radiation doses to workers. In addition, this guide helps the Canadian Nuclear Safety Commission (CNSC) determine whether proposed codes of practice are adequate.

Scope

This guide applies to all applicants for a CNSC licence to prepare a site and construct, operate or decommission a uranium mine or mill. In addition to discussing how codes of practice may be developed and used, this document describes the types of information that the CNSC typically needs in order to evaluate the adequacy of the proposed codes of practice.

1. Background

1.1 Regulatory framework and relevant legislation

The Atomic Energy Control Board (AECB) is the federal agency that regulates nuclear facilities and materials to prevent undue risk to health, safety, security and the environment.

At present, the AECB operates under the authority of the *Atomic Energy Control (AEC) Act* and regulations. However, these laws are soon to be replaced by new legislation, the *Nuclear Safety and Control (NSC) Act* and associated regulations.

Under the *NSC Act*, the AECB will become the Canadian Nuclear Safety Commission (CNSC), with continuing responsibilities for regulation of the nuclear industry.

The *NSC Act* and regulations will prohibit persons or organizations from possessing, using, disposing or abandoning certain nuclear materials without a licence from the CNSC, unless they are exempted from such requirements. The regulations will also stipulate prerequisites for licensing, including the information that is to be, or may be, included in applications for specific types of licences.

In particular, section 4 of the *Radiation Protection Regulations* will require all CNSC licensees to implement a radiation protection program, and to measure or estimate radiation doses to their workers. Additionally, the *Uranium Mines and Mills Regulations* will stipulate that applications for a licence to construct, operate or decommission a uranium mine or mill must contain a code of practice.

1.2 Definition of a code of practice

The legislation that pertains to uranium mines and mills will not contain an explicit definition of the term "code of practice." Instead, subsection 4(2) of the *Uranium Mines and Mills Regulations* will present the defining features of a code of practice in terms of its required content:

"An application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain a code of practice that includes

> *(a) any action level that the applicant considers appropriate for the purpose of this subsection;*

(b) *a description of any action that the applicant will take if an action level is reached; and*

(c) *the reporting procedures that will be followed if an action level is reached."*

To understand subsection 4(2), a reader must also refer to subsection 4(1) for the supporting definition of an 'action level':

> *"In this section, 'action level' means a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program or environmental protection program, and triggers a requirement for specific action to be taken."*

Accordingly, a proposed code of practice will consist of any indicators (that the licence applicant considers appropriate) of a loss of control of any part of a radiation protection program, descriptions of any actions the applicant will take, and the reporting procedures to be followed if an indicator is reached.

1.3 The licensing process and codes of practice

The CNSC's licensing process for uranium mines and mills will follow the stages laid out in law. This process will begin with an initial assessment of the environmental impacts of the proposed project and will proceed progressively through site preparation and construction, operating, decommissioning, and abandonment phases. At each licensing stage, the CNSC, upon receipt of an application that is complete and in the prescribed form, will review it to determine whether the applicant is competent and has made adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. If satisfied, the CNSC may issue a licence that contains relevant conditions.

The *NSC Act* and regulations will require licence applicants to provide certain information at each licensing stage. Accordingly, the information required by the CNSC at each licence application stage will depend upon the legislated requirements and case-specific circumstances.

At all licensing stages, licence applications may incorporate (directly or by reference) new or previously submitted information, in accordance with legislated requirements and the best judgement of the applicant. An application that is submitted at one licensing stage can thus become a building block for the next stage.

Under subsection 24(5) of the *NSC Act*, the CNSC will be empowered to include in a licence any condition that it considers necessary for the purpose of the Act. Accordingly, a CNSC licence may incorporate an applicant's commitments, a condition that incorporates an action level, or any other conditions that the CNSC considers necessary in the interests of health, safety, security and protection of the environment.

Upon receiving a CNSC licence, a licence applicant will become the licensee, and will be obliged to comply with the conditions of the licence in performing the authorized activities. If a code of practice is incorporated into a uranium mine or mill licence, the licensee must meet any corresponding obligations regarding action levels, responses, and reporting.

2. Developing and Using Codes of Practice

2.1 Codes of practice and radiation protection

When incorporated in a CNSC licence, a code of practice will become a regulatory and administrative tool to control radiation doses at the associated uranium mine or mill within the context of the licensee's radiation protection strategy. Accordingly, the code of practice and the objectives and broader content of the associated radiation protection program should be consistent.

The fundamental elements of an acceptable radiation protection program are qualified and committed personnel who are authorized and equipped to ensure radiation safety, appropriate procedures, and adequate resources. Appropriate combinations of these core elements — people, plant and procedures — can help ensure the safe conduct of CNSC-licensed activities.

At uranium mines and mills, the "plant" component of radiation protection programs typically includes engineered controls; the "procedures" component encompasses administrative controls and operating or work procedures. A key failure or deficiency in either component could result in a loss of control of some part of the associated radiation protection program.

To aid regulatory review, applications for a uranium mine or mill licence should clearly describe how the licence applicants propose to integrate their respective codes of practice and the associated radiation protection programs.

2.2 Codes of practice and action levels

When developing action levels for proposed codes of practice, applicants for uranium mine and mill licences should consult the AECB draft Regulatory Guide, C-228. C-228 describes how action levels for nuclear facilities and activities may be developed and used.

As noted in C-228, action levels for nuclear facilities should be expressed in terms of parameters that are useful for controlling the associated radiation protection programs.

Accordingly, action levels contained in codes of practice for uranium mines and mills should be expressed in terms of relevant parameters, such as:

- total effective dose
- gamma radiation dose-rate
- exposure to radon progeny
- exposure to radon gas
- exposure to long-lived radioactive dust
- concentrations of uranium in urine

2.3 Responding when action levels are reached

2.3.1 Legislation

The *Radiation Protection Regulations* and the *Uranium Mines and Mills Regulations* impose specific obligations on applicants for a uranium mine or mill licence, and on uranium mine and mill licensees, when an action level is reached. These obligations pertain to investigation, response and corrective actions, and reporting and notification.

The *Uranium Mines and Mills Regulations* stipulate that the proposed code of practice for a uranium mine or mill must describe:

- any action that the applicant will take if an action level is reached
- the reporting procedures that will be followed if an action level is reached

Additionally, the *Radiation Protection Regulations* require CNSC licensees to:

- conduct an investigation when an approved action level is reached in order to establish the cause for reaching the action level
- identify and take action to restore the effectiveness of the radiation protection program
- notify the CNSC within the period specified in the licence

2.3.2 Responses

By definition, an action level, if reached, may indicate a loss of control of part of a licensee's radiation protection program, and triggers a requirement for specific action to be taken. Accordingly, a monitoring result that approaches, equals or exceeds an action level, is often the first indication that certain responses are or may be required.

When an action level in a uranium mine or mill code of practice is reached, the licensee should first investigate to determine the cause. This investigation, and the protective measures specified in the code of practice, should be implemented as soon as the licensee becomes aware that an action level has been reached.

If an investigation confirms that a loss of control of any part of the associated radiation protection program has occurred, the licensee must identify and take corrective actions to restore the effectiveness of the program. The substance, severity and immediacy of this response will depend upon the specific circumstances, such as the cause and nature of any loss of control, the actual and potential consequences of any loss of control, and the licensee's preferences. If the effectiveness of the radiation protection program cannot be restored forthwith, the responsible licensee should propose appropriate interim measures for CNSC consideration.

Typically, the greater the actual or potential radiation hazards when an action level is reached, the more immediate, complex or rigorous the corresponding response should be.

Accordingly, when an action level is reached, the appropriate response could include:

- issuing direct reading dosimeters or other instruments

- posting radiation warning signs
- requiring the use of protective equipment
- restricting access
- suspending all or some operations
- restricting work to essential activity
- implementing other measures

2.4 Notifications and reporting procedures

Paragraph 6(2)(c) of the proposed *Radiation Protection Regulations* requires that licensees notify the CNSC within the periods specified in their licences if they become aware that an action level has been reached.

Accordingly, when an applicant for a uranium mine or mill licence submits a proposed code of practice that includes an action level, the applicant should also stipulate the reporting procedures to be followed if the action level is reached.

To provide for the necessary investigation, fact-finding and follow-up required by regulations when an action level in a code of practice is reached, the associated reporting procedures should include appropriate protocols for notifying the employees responsible for conducting investigations, implementing findings, and notifying the CNSC and others. These protocols should specify who is to be notified when an action level is reached, and how they are to be notified. The proposed notification procedures should indicate whether notifications are to be oral or written, and how they are to be delivered.

The urgency, frequency and level of reporting required in a proposed code of practice should be commensurate with the anticipated consequences of reaching the associated action level. For example, in many situations, the proposed notification of the CNSC may be limited to a follow-up report (within a specified time frame) that clearly, completely and accurately documents the event, the results of the investigation carried out, and the corrective actions taken.

Situations involving greater exposures to radiation or radiation hazards may warrant more immediate notifications of the CNSC. Where the licence applicant anticipates circumstances that could warrant a more prompt notification of the CNSC, the precipitating circumstances and the proposed follow-up should be clearly described in the proposed reporting procedures.

3. Substantiating a Code of Practice

Before issuing a licence under subsection 24(4) of the *Nuclear Safety and Control Act*, the CNSC must be satisfied that the applicant is competent and has made adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. The CNSC will arrive at these judgements by assessing the information provided by the licence applicant.

When evaluating the adequacy of a proposed code of practice, the CNSC may take into account other pertinent information provided in support of the associated licence application. This information could include:

- a complete description of the facility, areas and activities to which the proposed code of practice applies
- a description of the expected sources of radiation, and their anticipated characteristics (type, magnitude, variability)
- an assessment of the total effective radiation dose that will be received by workers during normal operations, and the related contributions from individual source terms, including radon progeny, long-lived radioactive dust, and gamma radiation
- a description of the proposed engineering and administrative measures to monitor and control radiation doses during the proposed operations
- a description of any areas of the proposed uranium mine or mill that are to be subject to radiation control measures other than codes of practice, and a description of the associated dose-control measures (such as work permits, bioassays and dosimetry)
- an evaluation of the radiological consequences, in terms of radiation levels, of any failure of the proposed radiation control measures
- an explanation of how any proposed action level has been derived
- if no action level is proposed, an explanation as to why no action level is deemed appropriate
- an assessment of the consequences of reaching or exceeding any proposed action level
- an evaluation of the effectiveness of the measures to be taken if any proposed action level is reached or exceeded
- a description of how the proposed code of practice integrates with the radiation protection program.